



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
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OFFICE OF  
SOLID WASTE AND  
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December 11, 2018

**MEMORANDUM**

**SUBJECT:** National Remedy Review Board and Contaminated Sediments Technical Advisory Board  
Recommendations for the East Waterway Operable Unit of the Harbor Island Superfund  
Site

**FROM:** Christine Poore, Chair *CLP Poore*  
National Remedy Review Board

Karl Gustavson, Chair *Karl Gustavson*  
Contaminated Sediments Technical Advisory Group

**TO:** James Woolford, Director  
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Sheryl Bilbrey, Director  
Office of Environmental Cleanup  
U.S. Environmental Protection Agency Region 10

**Purpose**

The National Remedy Review Board (NRRB) and the Contaminated Sediments Technical Advisory Group (CSTAG) ("boards") have completed a joint review of the proposed cleanup action for the East Waterway Operable Unit (OU) of the Harbor Island Superfund site, in Seattle, Washington. This memorandum documents the advisory recommendations.

**Context for Board Review**

The U.S. Environmental Protection Agency (EPA) Administrator established the NRRB as one of the October 1995 Superfund administrative reforms to help control response costs and promote consistent and cost-effective remedy decisions. The NRRB furthers these goals by providing a cross-regional, management-level, "real-time" review of high cost proposed response actions prior to their issuance for

public comment. The NRRB reviews all proposed cleanup actions that exceed established cost-based review criteria.

The NRRB's intent is to help control remedy costs and to promote both consistent and cost-effective decisions. Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), all remedies are to be, among other factors, cost-effective and protective. The NRRB considers the nature of the site; potential site risks; regional, state, tribal, community advisory group and potentially responsible party (PRP) opinions on proposed actions; the cost estimates' quality and reasonableness; and any other relevant factors or program guidance germane to site-specific advisory recommendations. The review's overall goal is to ensure sound decision-making that is consistent with current law, regulations and guidance.

Generally, the NRRB makes its advisory recommendations to the appropriate regional division director, and, typically before the region issues the proposed cleanup plan for public comment, the region includes the recommendations in the site's administrative record. While the NRRB's recommendations are expected to carry substantial weight, other important factors, such as subsequent public comment or technical analyses of response options, may influence the Agency's final remedy decision.

The NRRB expects the regional division director to respond in writing to its recommendations within a reasonable time, noting how the recommendations influenced the proposed cleanup decision, including any effect on the action's estimated cost. The NRRB's recommendations, while of considerable import, do not change the Agency's current delegations or alter the public's role in providing EPA with input on remedy selection.

The Office of Solid Waste and Emergency Response (OSWER; now the Office of Land and Emergency Management [OLEM]), established CSTAG in "Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites" (OSWER Directive 9285.6-08; February 2002; "principles directive"). Specifically, EPA established CSTAG as a technical advisory group to "...monitor the progress of and provide advice regarding a small number of large, complex, or controversial contaminated sediment Superfund sites...." A primary CSTAG purpose is to guide regional site project managers in appropriate site management throughout the cleanup process in accordance with the 11 risk management principles set forth in the principles directive. In the instance of the East Waterway review, EPA elected to have a combined NRRB/CSTAG review rather than separate reviews by both entities. In accordance with joint NRRB/CSTAG meeting protocols, five CSTAG members attended and participated in the drafting of the recommendations. The NRRB and CSTAG chairs led the meeting and NRRB procedures were followed.

## **Overview of the Proposed Action**

East Waterway is OU-10 of the Harbor Island Superfund site in Seattle, Washington; this maintained waterway was created during the construction of Harbor Island in Elliott Bay. The waterway's southern boundary is also the northern boundary of the Lower Duwamish Waterway Superfund site.

The preferred alternative, which includes a combination of dredging, engineered caps, enhanced natural recovery (ENR) and in-situ treatment, consists primarily of sediment dredging in the main channel area. If selected, this alternative would entail offsite disposal (landfill) of the dredged sediments. Dredging would remove a significant volume of contaminants, achieve risk reduction and provide certainty with respect to the waterway's future protection while also ensuring compatibility with its current and

anticipated future uses. In the limited areas where full dredging is unfeasible, the preferred alternative provides for partial dredging with engineered caps to cover the contamination remaining in these areas; the dredged sediments are expected to be disposed of in an offsite landfill. Due to the dredging impediment overwater structures pose, the preferred alternative provides for a 9-inch ENR sand/gravel layer to be placed over contaminated sediments in the waterway's south end shallow sill reach. This area is not used for navigation, reducing the likelihood of a future disturbance to the ENR layer. Similarly, because piers obstruct dredging, the preferred alternative recommends in-situ treatment (most likely with activated carbon) to treat sediments, with diver dredging as a contingency. Additionally, the preferred alternative includes institutional controls, which may take the form of seafood consumption advisories as well as restrictions on activities that may disturb the protective caps and ENR layers.

Should EPA select the preferred alternative as currently proposed, approximately 100 acres of the East Waterway will be dredged, 7 acres will be partially dredged and capped, 1 acre will receive an ENR layer, and 12 acres will receive in-situ treatment followed by an ENR layer. The total dredging volume is estimated at 960,000 cubic yards, with a total preferred alternative implementation cost of approximately \$290 million.

### **National Remedy Review Board and Contaminated Sediments Technical Advisory Group Recommendations**

The boards reviewed this proposal's informational package and discussed related issues with Region 10 management and staff on March 20-21, 2018. Based on this review and discussion, the boards offer the following comments, organized in two sections (national consistency, cost) with subsections, as appropriate:

#### **National Consistency**

##### **Long-Term Protectiveness/Interim Remedy/Applicable or Relevant and Appropriate Requirement Waiver**

Based on the information provided to the boards, it is unclear whether the proposed remedial alternatives can achieve the NCP's threshold criteria of long-term protectiveness and compliance with applicable or relevant and appropriate requirements (ARARs) (40 CFR § 300.430(f)). This lack of clarity primarily relates to the Region's use of 2 ppb total polychlorinated biphenyls (PCBs) as a preliminary remediation goal (PRG) in sediments based on natural background as defined by the Washington Model Toxics Control Act's (MTCA) and Sediment Management Standards (SMS). The Region considers that PRG to be an ARAR and plans to use it as a measure of protectiveness. However, based on the information provided to the boards, it appears that site-specific background concentrations are higher than 2 ppb. For example, the natural recovery model estimates that final East Waterway PCB sediment concentrations will be close to 40 ppb based on the current estimates of contaminant loading from the Green/Duwamish River. Therefore, it is unclear how the proposed remedial alternatives will achieve the PRG, ARAR and protectiveness criteria. The boards understand that efforts are underway to address upstream sources of contamination and better estimate the incoming contaminant load from the Green/Duwamish River.

Recommendation 1: The boards recommend that the Region re-evaluate contaminant load input parameters and collect incoming suspended and settleable solids data to clarify sediment and contaminant mass loading.

Recommendation 2: The boards recommend that a site-specific background concentration be determined and used to develop background-based PRGs.

Recommendation 3: The decision documents should also clarify how long-term protectiveness will be evaluated considering sediment and contaminant mass loading as well as regional and site-specific background concentrations.

Recommendation 4: If the Region chooses to propose a final remedy without first developing a site-specific background value, the boards recommend that the Region evaluate whether its identification of MTCA as an ARAR can be waived given that the information provided to the boards demonstrates that the proposed alternatives are unlikely to attain the identified ARAR (see CERCLA § 121(d)(1); 40 CFR § 300.430(f)(1)(ii)(C)). Or, if the Region continues to use the 2 ppb PCB PRG, then the boards recommend the Region propose an interim remedy since it appears unlikely that the preferred alternative can achieve compliance with this ARAR.

### **Applicable or Relevant and Appropriate Regulations**

Recommendation 5: The boards recommend the Region review and update FS Table 4-1, as necessary. For example, some ARARs appear to not be pertinent to the preferred alternative (e.g., the table provides a potential ARAR for groundwater quality, but the preferred alternative does not address groundwater). Some “ARARs” may be more appropriately categorized as “To Be Considered” criteria.

### **Contingency Actions**

In the materials provided to the boards, the Region states that, “diver assisted dredging will be considered as a contingency if monitoring indicates that in-situ treatment is not protective.” The boards were unable to identify performance metrics, such as sediment contaminant concentrations, that the Region will use to determine if “in-situ treatment is not protective.”

Recommendation 6: The boards recommend that the Region assess the recontamination potential from, or to, under-pier areas; clarify the anticipated post-remediation sediment concentrations; and identify the concentration(s) that would trigger a switch from the in-situ treatment remedy to the diver-assisted dredging contingency remedy.

### **Remedial Action Objectives**

The Region described how it considered the 11 principles identified in the 2002 principles directive. In its written discussion, on page 28, the Region states that: “*The remediation area was first developed based on the protection of benthic invertebrates (Remedial Action Objective 3) because remedial action levels based on Remedial Action Objective 3 risk drivers (including PCBs and arsenic) generate the majority of the remediation area. These remedial action levels were based on Washington State’s sediment management standards] benthic numerical criteria (these are the risk-based threshold concentrations for benthic community) and the tributyltin risk-based threshold concentration.*” From that statement and other materials provided to the boards, it is unclear whether Remedial Action Objective (RAO) 3 was developed in accordance with CERCLA risk assessment guidance.

Recommendation 7: The boards recommend the Region clarify that a CERCLA risk assessment was conducted and that unacceptable risks identified in the assessment were the basis for RAO 3.

Recommendation 8: The boards recommend the Region further explain its use of Washington State's sediment management standards for benthic invertebrates (RAO 3). Providing additional explanation of RAO 3 based on the State standards would clarify the rationale for the site's selected remedial footprint.

The ecological risk assessment presented to the boards appears to suggest that there is no risk to crabs or fish based on the surface water evaluation. The Region's assessment concludes that no contaminants of concern (COCs) were identified for fish or crabs based on the surface water evaluation, yet RAO 4 (*reduce to protective levels, risks to crabs and fish from exposure to contaminated sediment, surface water, and prey*) includes surface water. It was not clear from the information provided to the boards whether surface water needs to be included in RAO 4.

Recommendation 9: The boards recommend the Region consider modifying RAO 4 to exclude surface water or provide some explanation as to why the ecological risk assessment supports its inclusion in RAO 4.

### **Ecological Risk**

In the package presented to the boards, the ecological risk assessment summary was presented in the format of species or receptor of concern to represent various organism groups and receptor group hazard quotients. Although this information may be relevant, it is not clear how that assessment aligns with Agency ecological risk assessment guidance. For example, the "Ecological Risk Assessment Guidance for Superfund" (ERAGS, EPA 540-R-97-006, OSWER Directive #9285.7-25, June 1997) and "Guidelines for Ecological Risk Assessment" (EPA 630-R-95-002F, April 1998) stress the importance of presenting ecological risks in terms of assessment endpoints and measures of effects. The materials provided to the boards do not discuss the ecological risk assessment in those terms.

Recommendation 10: The boards recommend that the Region describe in its decision documents the ecological risks and the subsequent risk characterization in terms consistent with Agency guidance.

### **Human Health Risk**

The package presents the human health risk assessment results for tribal and Asian/Pacific Islander seafood consumption exposure scenarios, but not other consumers, such as recreational anglers. The Region determined that the preferred alternative will reduce the excess cancer risk from fish consumption in the adult tribal reasonable maximum exposure (RME) scenario from  $1 \times 10^{-3}$  to  $2 \times 10^{-4}$ . This post-remedy excess cancer risk is at the upper bound of the risk range identified in the NCP, 40 CFR § 300.430(e)(2)(i)(A)(2).

Recommendation 11: The boards recommend that the Region consider presenting the recreational angler RME to demonstrate the preferred alternative's risk reduction and level of protection to be achieved for a wider range of consumers.

Based on information provided to the boards, the baseline human health risk assessment (BHHRA) for the East Waterway site was completed in 2012. Since that time, the Agency has updated guidance associated with conducting baseline risk assessments, including identifying exposure parameters ("Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors," OSWER Directive 9200.1-120, February 2014). Additionally, EPA has updated several contaminants' toxicity information, including benzo[a]pyrene, in its Integrated Risk Information System database (on January 1, 2017).

Recommendation 12: The boards recommend that the Region review the BHHRA and revise components based on the updated information.

The information in the package provided to the boards was unclear as to how the Region assessed unacceptable risk within the CERCLA framework, as described in Agency guidance, such as the “Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions,” OSWER Directive 9355.0-30. The cumulative baseline human health risk should include all media that the RME scenarios indicated are appropriate to combine.

Recommendation 13: The boards recommend that the Region clearly justify the need for remedial action for each medium based on an unacceptable risk.

Recommendation 14: The boards recommend that in the decision documents, the Region be clear that the CERCLA human health risk analysis is separate and distinct from the potential ARARs analysis.

### **Waste Characterization**

The boards noted the estimated cost associated with dredged sediment disposal is approximately 35 percent of the estimated remedial cost (approximately \$100M). In the materials presented to the boards, the preferred alternative seems to contemplate disposal in a Resource Conservation and Recovery Act (RCRA) Subtitle D landfill, which only accepts non-hazardous solid waste. However, it is unclear from the materials provided to the boards that the Region has determined that removed sediment would in fact not be RCRA hazardous waste.

Recommendation 15: The boards recommend the Region re-evaluate whether contaminated sediment or other materials removed from the East Waterway may be RCRA hazardous waste that should be disposed of in a Subtitle C landfill.

Recommendation 16: The boards recommend that the Region consider whether there are local disposal options or beneficial use applications for the dredged sediment to reduce the cost.

### **Remedy Performance**

In the information provided to the boards, the use of an in-situ treatment such as activated carbon was identified for use in the under-pier areas. A concern of whether sorptive aggregate would remain stable on the steep side slopes adjacent to active berthing areas was raised during the review.

Recommendation 17: The boards recommend that during design, the Region consider reactive sorption mats for these slopes.

Residual site contamination post-implementation of the preferred alternative is estimated to result in a non-carcinogenic hazard quotient as high as 10, which is outside of the CERCLA acceptable risk range. Therefore, it appears that institutional controls may be essential for the preferred alternative to be protective of human health and the environment. Institutional controls are not discussed in detail in the materials provided to the boards.

Recommendation 18: The boards recommend that the decision documents include a detailed description of proposed institutional controls as well as how the institutional controls’ performance will be monitored and evaluated in support of a protective remedy.

The boards note that the preferred alternative appears to rely, in part, on the assumption that contaminant loading from upstream and upland sources will diminish over time. The Region assumes that sources, such as combined sewer overflows and other Clean Water Act-regulated outfalls, will not contribute the same quantity of contamination over time because Washington has pollution reduction programs in place for those sources.

Recommendation 19: The boards recommend that the decision documents clearly define these and other sources' incoming loads and, if necessary, include a monitoring program to verify continued contaminant load reduction from these sources.

### **Fish and Shellfish Contaminant Concentrations**

In the information provided to the boards, the Region did not identify the contaminant concentrations in resident fish and shellfish that are to be achieved by the remediation. The boards consider tissue concentrations to be the most direct risk performance measure of the RAO to "Reduce risks associated with the consumption of contaminated resident EW fish and shellfish..." Fish and shellfish derive their COC concentrations from both sediments and surface water in proportions that can only be estimated. Based on those estimates, the degree to which this CERCLA action will reduce fish and shellfish tissue concentrations appears to be highly uncertain. To ensure that the achievement of the RAOs can be measured, the 2017 OLEM Directive (9200.1-130) on Remediating Contaminated Sediment Sites states *"RAOs should be supported by statements that quantitatively describe the condition to be achieved by the remedy (e.g., expected concentrations in sediments or fish or expected levels of sediment toxicity) and the estimated timeframe for achieving the objective."*

The package presented to the boards discusses that long-term monitoring will be conducted for 20 years post-remedy implementation. However, Principle 11 in the principles directive states:

*"Monitoring should normally be conducted during remedy implementation and as long as necessary thereafter to ensure that all sediment risks have been adequately managed. Baseline data needed for interpretation of the monitoring data should be collected during the remedial investigation. Depending on the risk management approach selected, monitoring should be conducted during implementation in order to determine whether the action meets design requirements and sediment cleanup levels, and to assess the nature and extent of any short-term impacts of remedy implementation. This information can also be used to modify construction activities to assure that remediation is proceeding in a safe and effective manner. Long-term monitoring of indicators such as contaminant concentration reductions in fish tissue should be designed to determine the success of a remedy in meeting broader remedial action objectives. Monitoring is generally needed to verify the continued long-term effectiveness of any remedy in protecting human health and the environment and, at some sites, to verify the continuing performance and structural integrity of barriers to contaminant transport."*

Recommendation 20: The boards recommend that the Region identify target fish and shellfish tissue concentrations consistent with the 2017 Directive and the approach used for the Lower Duwamish Waterway remedy.

Recommendation 21: Since remedy implementation is anticipated to take approximately 10-13 years, the boards recommend that the Region consider developing and implementing a monitoring plan, including establishing baseline conditions "during remedy implementation and as long as necessary thereafter to ensure that all sediment risks have been adequately managed." The monitoring's focus should be the

media included in the RAOs. As described in the 2017 sediment directive, *“The monitoring endpoints used to measure progress towards or achievement of RAOs (e.g., fish tissue contaminant concentration or benthic toxicity) are site-specific, and should directly indicate the RAO and be linked to the remediation (i.e., the remediation is intended to directly affect those receptors).”*

### **Site Characterization of Slip 36**

Based on the information provided to the boards, there appears to be a significant data gap with respect to sediment characterization (e.g., depth of contamination, potential COCs) within Slip 36, which the United States Coast Guard owns and operates.

Recommendation 23: The boards recommend that the Region engage with the Coast Guard to implement additional studies consistent with their federal responsibility as an owner and operator under CERCLA.

### **Early Actions**

Based on the information provided to the boards, the preferred alternative does not incorporate early actions. Both the January 2017 sediment directive and the Superfund Task Force promote use of adaptive management as well as early actions and interim remedies under appropriate circumstances.

Recommendation 24: The boards recommend that the Region consider early actions for potential higher source areas, such as the Coast Guard slip or areas with significant prop wash effects.

### **Cost**

#### **Cost Effectiveness**

The package provided to the boards states that the net-present value costs were calculated without a discount rate, contrary to “A Guide to Developing and Documenting Cost Estimates During the Feasibility Study (OSWER Directive No. 9355.0-75, July 2000), which calls for a 7 percent discount rate. Pursuant to the cost estimate guidance, the 7 percent discount rate and a sensitivity analysis may be included in decision documents, though the 7 percent discount rate should be the basis for the nine-criteria analysis.

Recommendation 22: The boards recommend that the Region include a 7 percent discount in the decision documents as well as a sensitivity analysis using a lower discount rate.

### **Conclusion**

We commend the Region’s collaborative efforts in working with the boards and site stakeholders, including the State and Tribes. We request that a draft response to these recommendations be included with the draft proposed plan when it is forwarded to the Office of Superfund Remediation and Technology Innovation’s Site Assessment and Remedy Decisions Branch for review. The branch will work with both your staff and the boards to resolve any remaining issues prior to the release of the East Waterway’s record of decision. Should issues be unresolved, they should be elevated in accordance with the “Elevating Site-Specific Superfund Remedy Selection Issues between the Office of Superfund Remediation and Technology Innovation (OSRTI) and Regional Superfund Program Offices” (OSWER Directive: 9200.3-68) memorandum.

This memo documenting the boards’ advisory recommendations for the East Waterway OU of the Harbor Island Superfund Site will be posted to the NRRB’s website

(<https://www.epa.gov/superfund/national-remedy-review-board-nrrb>). Once it is final and made part of the site's administrative record, the Region's response will be posted on the NRRB's website.

Thank you for your support and the support of your managers and staff in preparing for this review. Please call Christine Poore at (703) 603-9022 or Karl Gustavson at (703) 603-8753 should you have any questions.

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